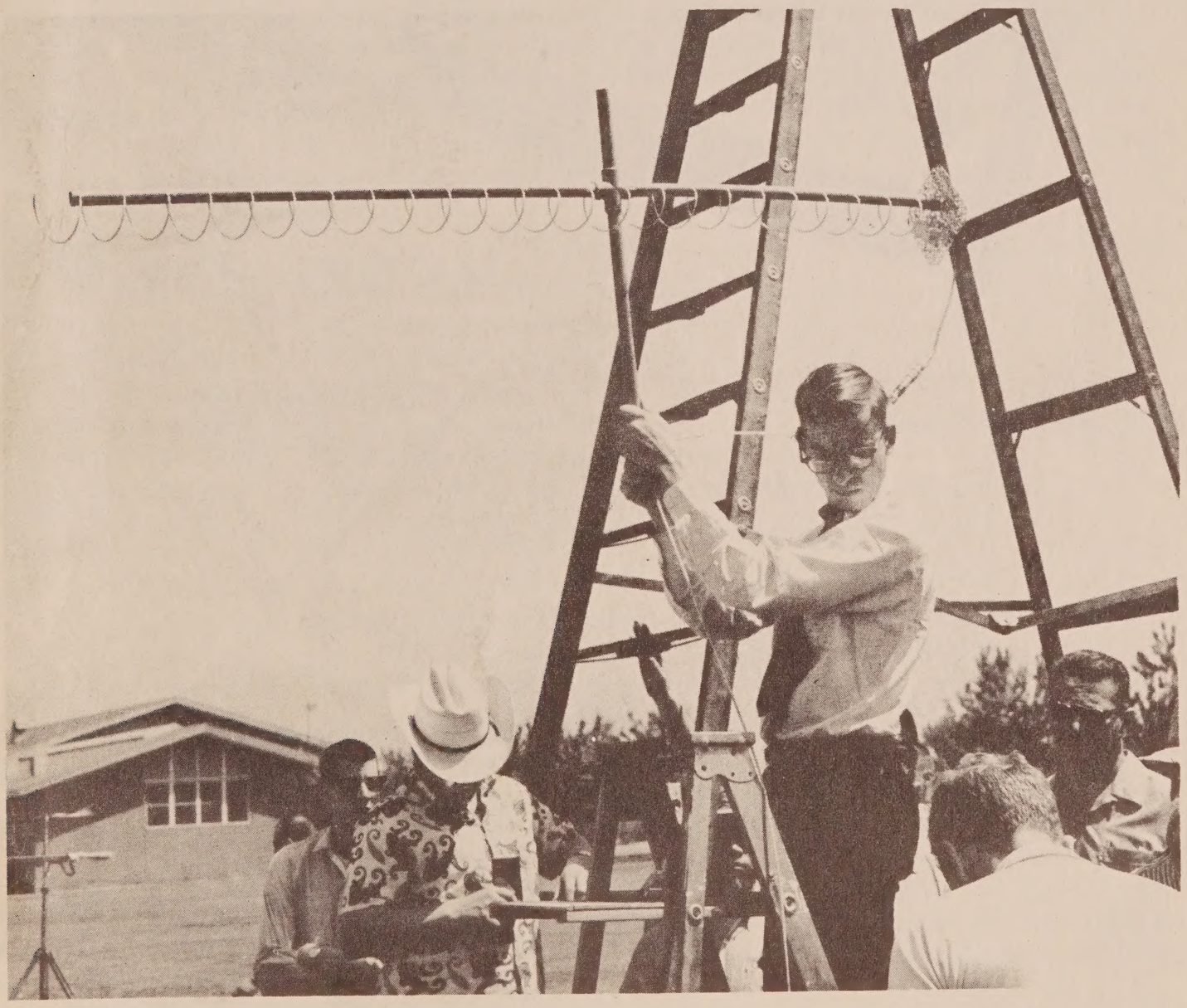
VHFER

LEARN BY DOING

50 MC. AND UP

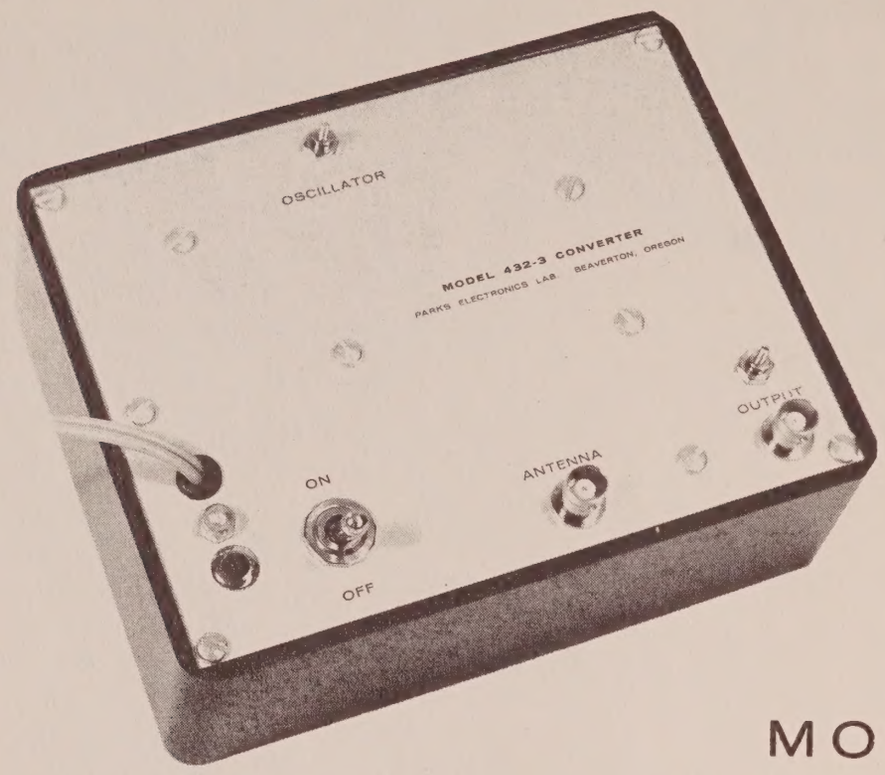
Volume 5, No. 3 May-June, 1967



WB6IOM and his 24 turn helix

ANTENNA CONTEST

A 432 DX MAN'S CONVERTER



MODEL 432-3

NEW FEATURES:

--All solid-state design
--Zener-regulated a.c. power supply
--Extremely low-noise front end-- 4 d.b. or less.
--High image and I.F. leak-through rejection
--Excellent frequency stability.

This converter uses the Texas Instruments TI-XMO series transistor. We pick the best from the 01 and 06 types to give you performance equal to or better than the general run of the former TIXMO5, apparently no longer available---at least for now. From our tests these transistors are superior in performance to the 2N3399 we formerly used and cost much less. They're also less expensive for you to replace if you damage them with r.f. This converter has a tuned input, something our previous converters and preamps did not have. It cuts down on interference from other stations in the big cities.

ORDERING INFORMATION: Price is $55.00 postpaid. Add 35¢ for Special Handling, a fee charged by the post office for faster delivery. Add $2.50 for Air Mail.

I.F. Ranges available put 432 Mc. at 26, 27, 28.1, 29, 30.5, 49 or 50 Mc.

Type BNC connectors only.

PARKS ELECTRONICS LAB.

ROUTE 2 BOX 35 BEAVERTON, OREGON

VHF ANTENNA CONTEST
by K7AAD

The antenna contest at the VHF Conference in Fresno this last May was quite improved over previous ones and though it leaves a bit to be desired it has come quite a way. Bob Melvin, W6VSV, is responsible for a good part of that. Bob has consistently provided good equipment for the measurements. This time he had a reference antenna built as described by a Bureau of Standards article which should eliminate some of the reflection problems possibly caused by the use of a dipole as we normally use it. Next year it is planned to have the signal source antenna on some sort of cherry picker or mobile mast that would be over 40 feet high so that all test antennas could be pointed upward at an appreciable angle above the horizon. Ground reflections are always a problem. But it is probably the big antenna that hasn't gotten a fair shake in the past. The big 432 arrays of the past were not there, tho their owners were. The shift was definitely to 1296. There were surprises in store for many antenna owners and spectators, as the following table and pictures will show. Credit for most of the pictures goes to George Chong, W6BUR. He is not responsible for bad press camera work on my part (making the half-tones for printing). First chart is 432, gains referenced to a dipole . (db)

Entry #	Call	Description	Meter Reading	Gain
0	W6VSV	Bureau of Stds ref. ant. of known gain	0	7.7
1	WB6PDN	14 element J slot	0.5	8.2
2	WA6NCT	Dipole of questionable match	-7.7	0
3	WA6GYD	11 element Yagi	5.1	12.8
4	W6PUZ	11 element Tilton Yagi	5.3	13.0
5	K6HOU	"Clean Sweep" yagi, 6 elements	-0.5	7.2
6	K6HCP	Ref. dipole on beer can balun, optimized	-4.5	3.2
7	K6HAA	32 el. extended-expanded W6GD, 6AJF match	13.0	
8	W6BUR	11 el. Tilton Yagi	5.0	12.7
9	VE3DNR	9 el. quad	0.5	8.2
10	W6BUR	11 el. Tilton Yagi tested last year	3.8	11.5
11	W6PUZ	16 db W2CCY Yagi, 13 el	3.3	11.0
12	W6TZJ	Corner Reflector 90 deg. 2' x 3', dipole feed	0.5	8.2
13	WA6MGZ	LaFayette UHF TV dish, stock, beer can balun	-.5	7.2
14	WA6NCT	UHF TV corner reflector	-1.5	6.2
15	K6MIO	Cyl. parabola, 7 dipole colinear feed	5.5	13.2
16	WA6NCT	Dipole fed corner reflector	-1.5	6.2
17	K6MIO	7 dipole colinear (parabola feed)	2.0	9.7
18	K6HCP	LaFayette 4' dish, dipole feed	0.5	8.2
19	K6MIO	8' dish with homebrew ext. to 12.5 ft diam.	9.2	16.9
20	W6TZJ	16 el. Cushcraft with homebrew balun	2.6	10.3
21	W6ZOP	Large half horn	0.0	7.7
22	K6HAA	W6GD colinear 32 el	8.5	16.2

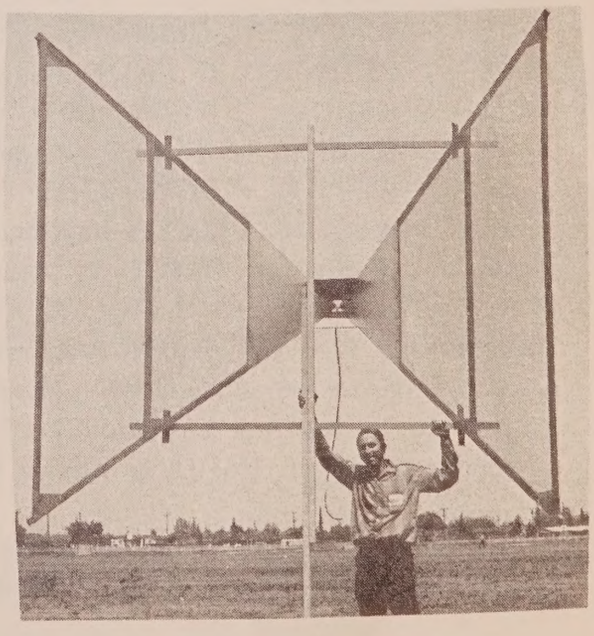
Discussion: Well a W6GD colinear won again. They always do. A lot of hams have asked where to get the design. Essentially its in the CQ VHF handbook. If Lanny wants to draw up a diagram & procedures we'd be glad to print it and it would make a number of readers happy. K6RIL & others also have "proven" antennas of this type.

I don't know why number 6 checked so good unless there was skulduggery which is decidedly not out of the question. Past contests have proven that. Maybe #7 is a record-

ing error. I only print it as I got it. Notice that only one commercial antenna was brought that was a yagi type advertised for 432. There's a good reason. Get the hint? I notice #19 had slightly more gain than #22 but contest rules are that the antenna must be capable of being handled and directed by one man so I don't think #19 qualifies.

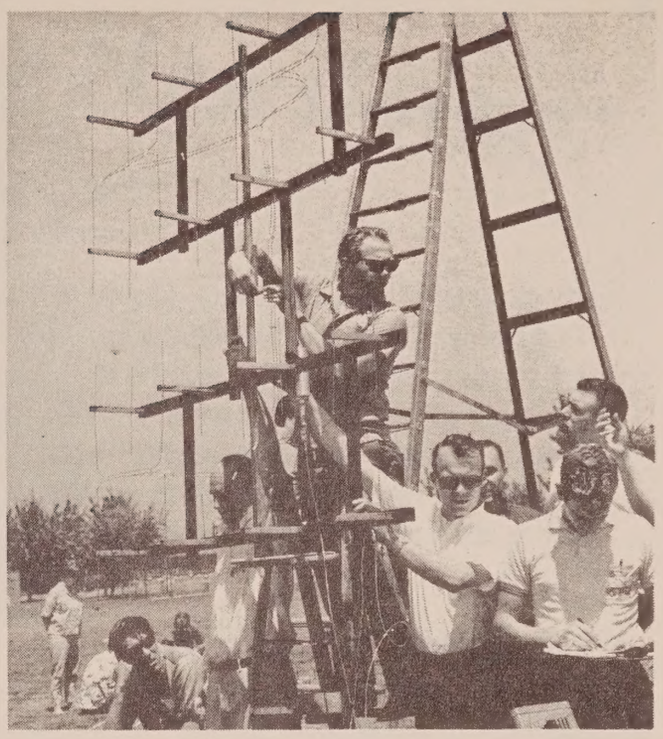
1296 CONTEST RESULTS

Entry #	Call	Description	Gain over dipole
1	std. ant.	9.95 db above isotropic	8.0
2	WA6KKK	60 degree horn	7.5
3	W6GDO	Brass dipole	-2.0
4		Dipole with solid reflector(splash plate)	2.0
5	W6GDO	32 element colinear (W6GD)	14.0
6	W6GDO	Inv. Disc cone AT344	-2.0
7	K6HCP	Clear Beam 4' dish with 3/8" mesh (TV type)	15.6
8	W6GDO	Stoddart standard dipole	0.0
9	WB6IAG	4' dish 1/2" mesh TV type (Clear Beam)	17.3
10	WA6MGZ	4' dish with foil	16.2
11	K6HMS	Solid Aluminum Horn	11.5
12	WA6MGZ	Same as 10 but different feed	16.1
13	WA6MGZ	Same as 10 but foil removed	12.4
14	K6HCP	Same as 7 with IAG feed	16.3
15	W6BUR	32 el colinear (silver plated)	12.8
16	WA6NCT	Zig-zag antenna	7.0
17	WA6GYD	32 element colinear	14.2
18	WA6NCT	Coffee can	3.1
19	WA6NCT	UHF corner reflector (stock TV ant & balun)	5.1
20	WB6IOM	24 turn helix, 3" diam., 3" spacing	8.2
21	K6HOU	8 element "Clean Sweep" yagi	7.8
22	W6BUR	32 el (same as 15 but new balun)	11.5
23	K6MIO	Big dish and std. ant. feed	17.1
24	K6MIO	12.5 ' dish with IAG feed	16.8
25	W6ZOP	Half horn monster	10.1

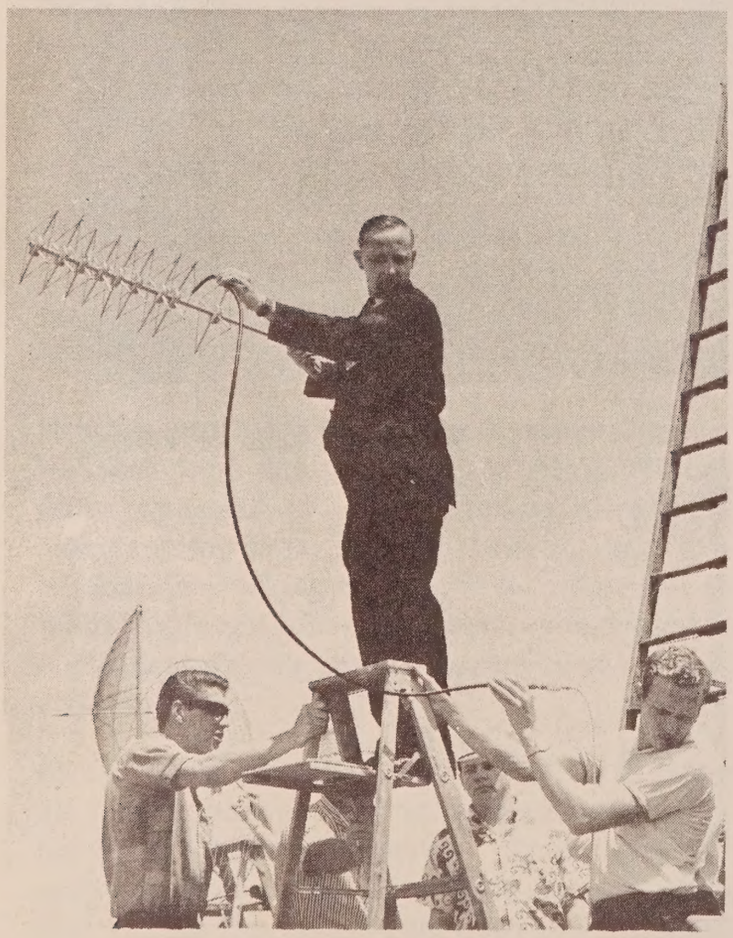


K6HOU's "swept" antenna and W6ZOP's half horn.

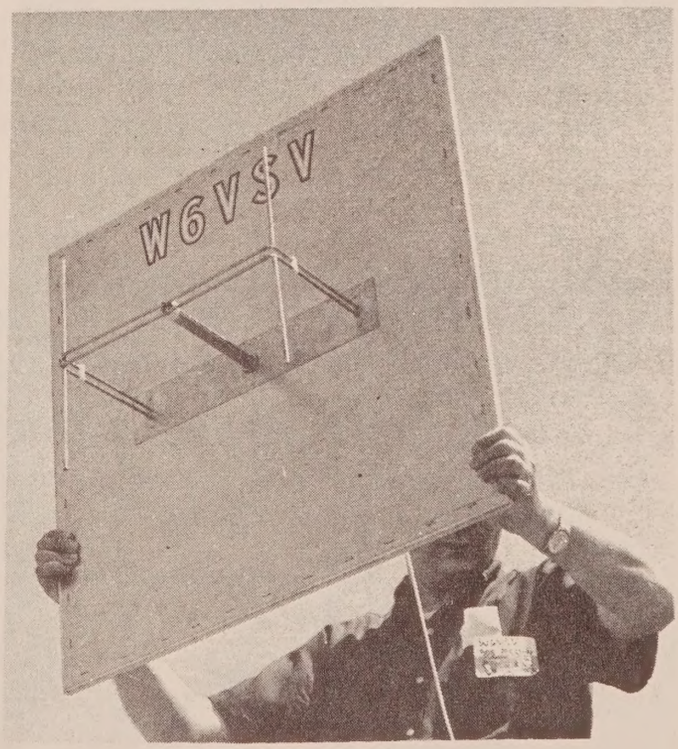
WA6MGZ's UHF TV antenna



K6HAA's 32 el colinear



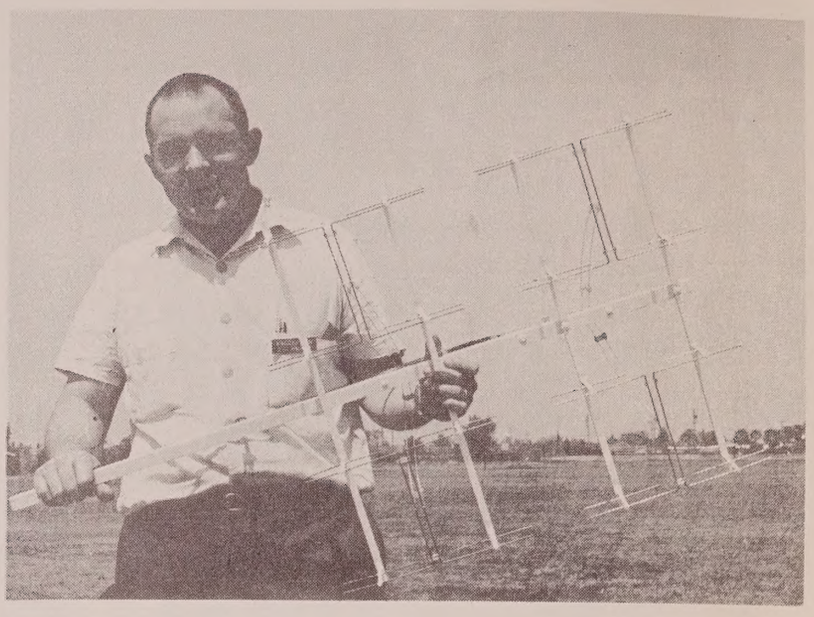
VE3DNR's quad



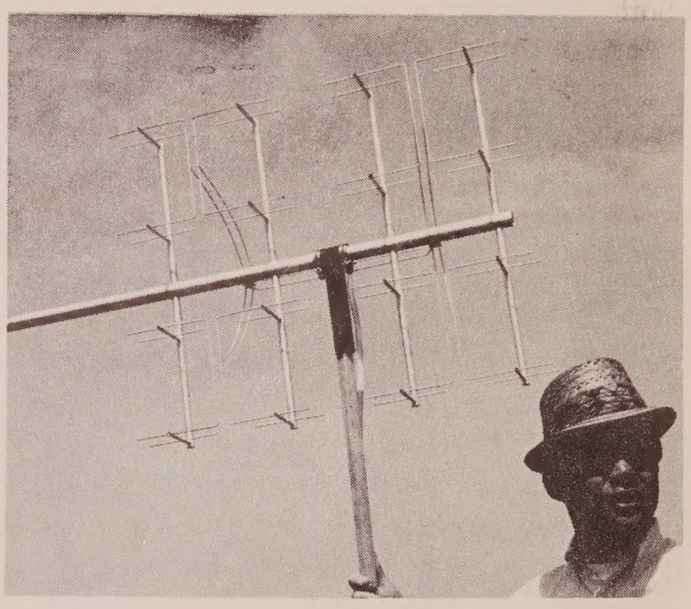
W6VSV's reference antenna

VHFER magazine is published every other month by Parks Electronics Lab., 419 S.W. First, Beaverton, Ore. 97005. Subscription rates: U. S. & possessions, $1.50 per year, Canada & Mexico, $1.75 per year, others $2 per year. Second class postage paid at Beaverton, Oregon 97005.

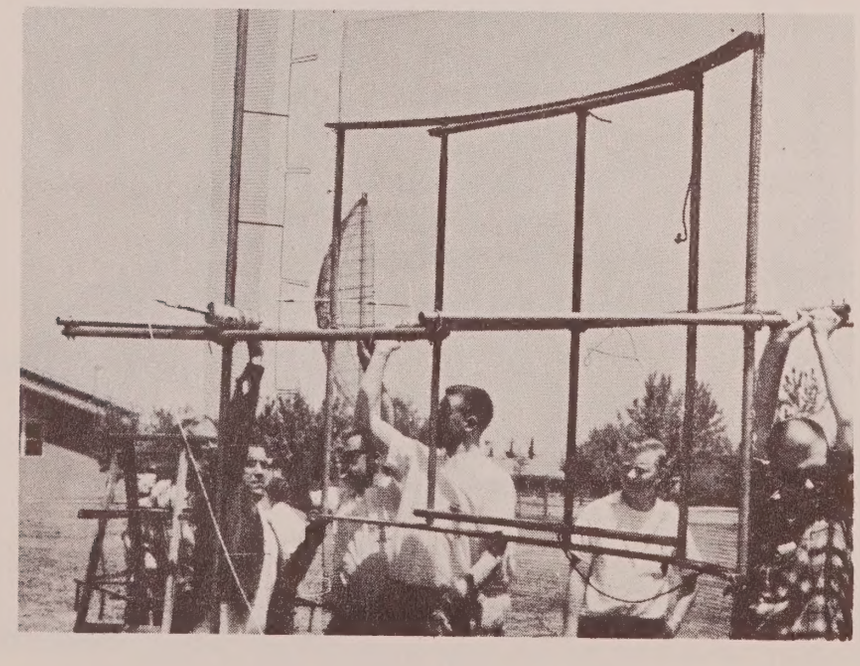
WA6GYD & his 32 el. colinear



W6TZJ & his corner reflector



W6BUR's 1296 colinear



K6MIO's cylindrical parabola

Moonbounce Newsletter

by Victor A. Michael, W3SDZ
Box 345, Milton, Penna.

The first concept one must grasp is that antennas for moonbounce must of necessity be large in size and gain. In addition it can be said that the higher in frequency you go, the smaller in physical size the antenna can be made providing power output can be held constant and receiver noise figure (at the antenna terminals) held to values in the one to two db. region. Now of course trade-offs can be made--such as larger antenna gain can be used to make up for the lower equipment performance at the frequencies above 1 Gc. At any rate we have to think in terms of building antenna systems that have a lot more gain than most amateurs think about building.

There is a great temptation to think that the only type antenna to use for moonbounce work is a parabolic dish. There is something very esoteric about a dish that inspires great faith in the VHF man. Unfortunately on 432 and down the dish tends to be a waste in size and bulk. On 432 you would like to have something just over 30 db of gain (over an isotropic radiator) and on 144 something over 26 db. Since you get this antenna gain on both xmit and receive, a loss of one db means a two db loss in echo returns. So you see it is important not to fudge these figures very much in the downward direction. Any more gain is going to go up by the same factor of two, so get all you can.

Back to this problem of size vs. gain. There is a definite relationship between size and maximum gain obtainable from the size. You can calculate this factor as follows:

$$\text{Area Gain} = \frac{4\pi A}{\lambda^2}$$

A = area of antenna in square feet
AG = whole number power gain
λ^2 = wavelength in feet squared

This will tell you the maximum gain you can obtain for a given size antenna (in area) over an isotropic source. In very small devices such as a dipole or small yagi, this requires further interpretation. But for large antenna structures such as we have to consider, it is very workable.

Now you will note I said the maximum gain obtainable. There is no known way to do better than this, and in normal practice, antennas that are no more than one to two db down from area gain are considered excellent antennas. Now a dish (as used by amateurs) is always going to be at least three db down from area gain. Three db down means that the antenna is working only up to half its area in theory. This is the reason I make the statement that a dish from 432 down is not necessarily the best way to go. What I hope to point out is that driven arrays can be built for these frequencies that can achieve higher overall efficiencies.

SELECTION OF THE UNIT ANTENNA: This is where one must be very careful, as we all tend to have our favorite antennas. To further complicate things, there is a good case for all the various antennas. To determine the best route to go we must look at this large aperture we want to fill up with antenna elements and determine where the losses come in that reduce the actual gain over the full area gain. In the case of the parabolic dish, the tapered illumination and spill-over of the feed system reduce the efficiency. If we could build a feed that had constant illumination from the center to the edge of the dish and then complete cutoff, we could build close to a 100% aperture. As you can visualize, this is a rough assignment for which there is no simple solution.

With the driven arrays, the losses show up in a slightly different manner. The goal would be to fill the aperture with dipoles spaced so that the aperture of each antenna just overlaps. In addition the power should be distributed to each of the dipoles in equal amounts and in phase. Ideally there would be no loss in the phasing harness.

The colinear antenna comes close to meeting the above requirement. The only problem this antenna presents is in the necessary power distribution system. Since there are more individual elements in a system of this type, there will of necessity be a small increase in overall loss in the matching harness. The colinear has much to offer, however. It is a relatively low-Q device and therefore a broadband device. This all means that an amateur who doesn't have the time and ability to measure things carefully enough to go through the design effort for an individual antenna element (such as a yagi) can duplicate a colinear design and have confidence that it will probably work well with little adjustment. I have made this statement before--the best antenna I ever had for 432 was a 256 element colinear array of standard design. Next month we'll continue with the yagi.

MOONBOUNCE AT THE VHF CONFERENCE
by K7AAD

It might seem like we're overdoing this moonbounce stuff and maybe so, since very few of our readers are even slightly interested in attempting such. But if you look at a lot of the articles written in VHFER as a means of getting the most out of what you can afford, I think you'll benefit. K6MYC's experiences clearly show that the antenna makes the difference, because that's all he had that hundreds of our readers don't have. Here is the fantastic story.

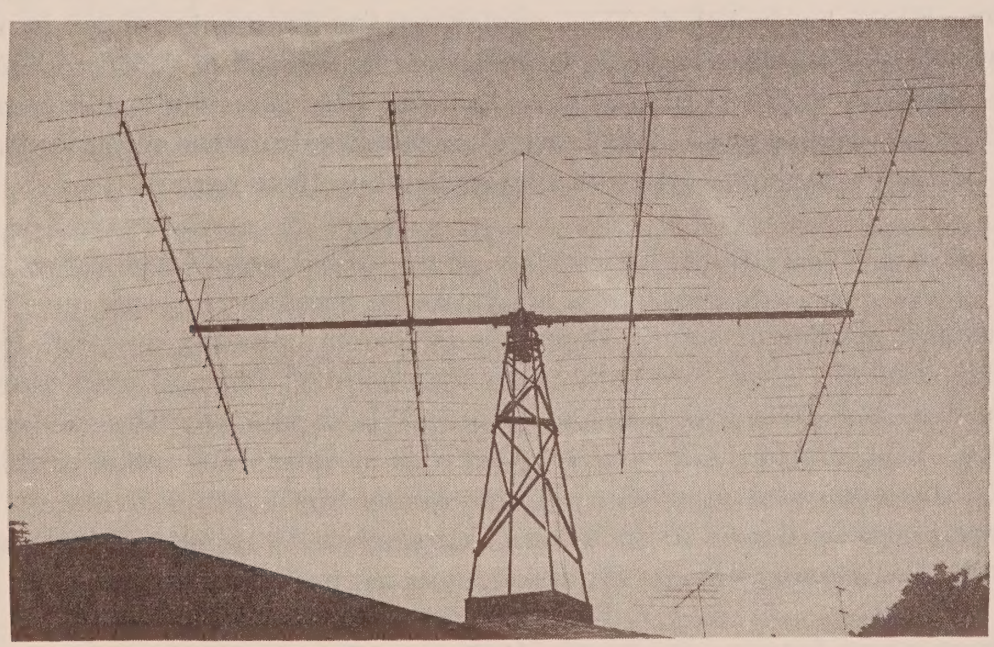
When K6MYC was setting up to work VK3ATN, which he did, he was working for his SECOND two-meter contact. The first one was just a few blocks away. Next, and this is even harder to believe, Mike's exciter and receiver was an SB-34, a mobile sideband rig--just like mine. I nearly fell out of my chair when I heard him say that. What he had that made the difference is an antenna, one any ham of average skill could build for probably $50. Of course he had a KW rig, but there are hundreds of those around and they aren't expensive. So what now is to keep a hundred other hams from doing moonbounce with their own gear now that K6MYC has shown how determination and brute force will do it. W6DNG's approach was different--one of meticulous care, getting the maximum of performance out of everything. Of course there was no guide, he was a pioneer. And with a lot only 40 feet wide and heavy traffic nearby, his techniques had to be different.

Both moonbouncers brought tapes of echoes and contacts to the VHF Conference in Fresno. Less imagination was required to hear the signals than previously. Bill (W6DNG) had some other tapes he left at home because "nobody would believe it, anyway." These are tapes of his contacts with OH1NL in Finland using FSK and gating a tone generator. FSK picks up 3 db right away and with other techniques Bill has used in the past I'll bet he does have good tapes.

During K6MYC's early attempts at an echo, he used a transistor converter with no success. The converter did test very good for noise figure. He borrowed a Parks converter locally and got echoes right away. Apparently the high intensity of r.f. signals in the bay area was causing cross-modulation in his transistor converter making it effectively very noisy. A cavity filter in front of it cleaned things up so that he could get echos through it. Maybe this would help some of the "advanced" hams using transistor converters in congested areas.

Here are some excerpts from K6MYC's letters to me. " My May skeds with F8DO were again a single-ended success as F8DO reports he copied us on 144.004 and Vic, WB6KAP, on 144.0047 for almost a solid hour. Neither of us heard a thing. We've also been running echo checks with Ken, K6HCP, who now has 2 28' boom yagis. So far Ken's heard nothing and we've heard our echos consistently but quite weak as the portion of the sky at the time of the tests was not its quietest. Last Sunday we tried again but neither of us heard a thing as our sky noise was about 6 db above normal. Ross, WB6DEX, heard his own echoes weakly and copied our signals briefly on two occasions. Following is a couple of sked times for VK3ATN, all GMT. July 31, 1738. Aug. 5, 2216. Skeds go plus and minus 12 min. from times listed." From June 21 letter, "First sked with F8DO we heard nothing. Second we heard a carrier on Marius' freq. for about 15 sec. with moon echo type fading. Last sked heard nothing. We had our own echoes at one time or another during each sked. My conclusion at this time is either Marius' 72 elements of 8-9 element Yagis does not have 20-21 db gain or he's not getting 500 watts to the antenna. I heard my own echoes over quite a range of amplitudes and with 22.5 db antenna certainly should hear even a signal that is 5-8 db down from me. Sked with VK3ATN went a little better, although Faraday appeared to be quite slow during this sked as I never heard my echos during a 40 minute attempt.

I've been making some interesting comparisons between a hopped-up 75A3 & audio filter and my SB-34. No matter what bandwidth I can achieve with the A3 system I can still hear the same weak signal thru the SB-34 speaker. When I finally lose the signal in the A3 system it is also gone in the SB-34. Apparently my ears give the SB-34 a 60-90 cycle bandwidth. A note from Ray, VK3ATN for all the 432 & higher bugs. Ray has a 50 foot dish under construction that should have a surface good to 2300 MHz. Ray expects to be on 432 with this antenna late this year. It will be polar mounted and able to track from horizon to horizon allowing much more time on the moon than his 2 meter rhombics. For more info tune to 21.415 MHz on Mondays at 0200 GMT, 7 pm PDT Sunday eves."



Here's K6MYC's array of Cushcraft colinears, one half of the orignal antenna used to work VK3ATN in Australia on 2 meters. WB6KAP has the other half.

BACK ISSUES OF VHFER

We regret that we are quite a ways behind in answering VHFER correspondence. We lost our part time man and have to get another. We have very few back issues left, probably not over 50 or so. There is a possibility we will improve that situation somewhat because some issues would be complete if we would print only one sheet (4 pages) of it. Our printing this time is 2400 copies. We appreciate your support, we need your articles.

MICROWAVE

In a few sections of the country, frequencies as low as 432 are without further challenge to a number of the experimenting types. Reasonable converters and transmitters can be built and antenna construction has improved tremendously. So for those looking for new bands to conquer microwave is about all that's left. The techniques are different. Hams working there are not appliance operators, and enthusiasm can be transferred easily when the right groups get together. At the VHF conference in Fresno this was quite evident to me. I was already to forget about making a living and just go full blast toward 1296. After a few days I returned to my senses. If I had an eight hour a day job it would be different, but I have only eight hours off and I have to get some sleep. So while we would LIKE to help and guide, it is presently out of the question. Perhaps we will have a 1296 converter by late fall. But I won't design it, because if I did it wouldn't be marketable. W7UHF is working on it. Don't hold your breath.

One of the enthusiasts I met in Fresno asked if I would assist him in compiling a directory of microwave hams. The problem is that these people are so few and far between except in heavily populated areas that there are people working alone who could be skedding--if they just knew who to contact. We will publish a list in VHFER at a later date. But for now, if you have OPERATING equipment (no dreams), please send your name and address and a little note about your interests to Leland M. Farrer, K6KBE, 492 Lomer Way, Milpitas, Calif. Home Phone is Area 408 262-2906. Information on sources of equipment is also wanted. Mel travels extensively in the eight western states and would be happy to visit anyone in that area when time permits.

Here is a report on Mel's activities: On June 4, Dick, K8KDX and I made two shots on the 5850 Mc. band. The first shot was a short one of 3 miles to check out the equipment and work out any alignment bugs. Copy was excellent, pinning the AGC level indicator on both I.F. strips. Power in both cases was approx. 500 millwats output. I was using a 4 foot dish and Dick was using a 2 footer. Both stations were polarplexers with 90 Mc. I.F. strips. The second shot was 20 miles and many problems arose---freq. drift because of a.c. power change, heavy fog layer, FM station leakthru in the I.F. strip and errors in orientation. All in all a 10 minute contact was made. The directory is coming along with about 30 hams in the west listed.

A note of info. about a new antenna design for VHF from Electronic Design mag. In Vol. 15, #10 dated may 10, 1967 on page 33, a news release describes a short backfire antenna. Ed. note: Mel sent this info to us. Since Electronic Design is circulated to industry and I had a copy, I will stick my neck out and print this with the hope that Electronic Design will be understanding and not sue me for violation of a copyright. It is extremely interesting and I hope of benefit to some of our readers. I regret my picture will probably not reproduce well. I am not the best cameraman.

Short-backfire antenna may be uhf boon

A physicist at Air Force Cambridge Research Laboratories, Bedford, Mass., says that his recently developed "short-backfire" antenna could be a boon to home uhf television viewers as well as NASA satellite tracking stations.

It is based on Hermann W. Ehrenspeck's own "backfire" antenna—a relatively little-known approach to antenna design. According to its inventor, the backfire antenna operates on a combination of surface-wave and open-cavity principles and introduces gains of from 15 to 30 dB. Moreover, sidelobes are said to be reduced to below 20 dB, backlobes below 30 dB. One backfire antenna is claimed to have a gain of 23.5 dB above isotropic—higher than the gain of a commercial 16-element Yagi array or a 36-element cavity-backed slot array—typical tracking and telemetry antennas.

The name derives from the use of a large plane reflector opposite the feed of an endfire antenna like the Yagi. The signal is propagated along an array of dipoles, reflected from a flat plate and redirected across the dipole array. Thus, the main beam fires backwards and the dipoles serve double duty.

The double-reflector configuration is analogous to that of a laser cavity, which employs two end mirrors to build up the energy level.

As shown in the figures, the short-backfire antenna is the most abbreviated type conceivable—approximately one-half wavelength long—and consists of a 2λ-diameter flat plate with a circular quarter-wave rim, a dipole feed spaced a quarter-wave in front of this reflector, and a smaller disk spaced a quarter-wave in front of the dipole.

An array of short-backfire antennas uses far fewer elements to produce the same gain as other types with the same total aperture area. Thus, a short-backfire antenna $\lambda/2$ long can replace a 5.5λ, 27-element Yagi; an array of 8 short-backfire antennas (or 4 backfire antennas) can replace a monopulse array of 36 slot elements or 48 dipoles. Weight savings permit the use of a smaller, less expensive mount.

The element feeds can be cross or circularly polarized, and the short-backfire antenna is adaptable to monopulse arrays as well as pencil-beam operation. It is also said to perform excellently in feeding paraboloidal antennas.

Representatives of NASA's Goddard Space Flight Center, Greenbelt, Md., are reported to be interested in a network of telemetry stations using this antenna.

Ehrenspeck said uhf set owners could use "chicken-wire" short-backfire antennas for good reception. ■ ■

(continued on back cover)

EXCERPTS FROM THE OSCAR NEWSLETTER

EURO-OSCAR. Tests and evaluation of the satellite package received in April are still proceeding. Delay is caused by time required to exchange notes with DJ4ZC, the builder. Launch of this satellite is not imminent at this time.

AUSTRALIS-OSCAR is a beacon and telemetry system which radiates 100 mw on 144.050 MHz and 250 mw on 29.450 MHz. The signals will be modulated with audio frequencies which provide the telemetry data. Seven telemetry information channels are transmitted sequentially and are followed by a pair of HI's which serve as the identifier and which provide the reference point in the keying sequence. Antenna polariation will be linear. After some modification, environmental testing is expected to take several months. After that another 3 to 9 months is the normal delay between having a package available and the actual launching.

THE COST OF SUCCESS IS PREPARATION. It is not very likely that there will be a launch before the next regularly scheduled Newsletter (in October), but there is much that most of us need to do in preparation for whichever satellite is launched next. Antennas must be built, reworked, or adapted for the task. Receivers and low noise converters are to be obtained. Full duplex capability is to be achieved. This will not be too difficult to accomplish on the split-band operations such as the two-to-ten meter arrangement, but, when Euro-OSCAR is launched, the ability to transmit and receive simultaneously with only 1.8 MHz frequency separation will not be easy to attain. Such capability will be very helpful in satellite operations if it can be done, however. Certainly duplex operation gives the transmitting operator much more confidence in establishing contacts if he can hear his own signals being repeated back to him, and he can avoid unnecessary calls when the other station is already answering someone else.

VHFER NOTE: At the VHF Convention in Fresno I learned a few things about the OSCAR group that were interesting to me and I would like to pass them on to you. First, the problem the OSCAR group has is getting satellites, and not getting space on a launch vehicle. The ham satellites have to be built and tested to meet military specifications. The people who have the know-how to do that apparently do not care to get together & put a satellite package together, with rare exceptions. It certainly isn't for the average ham to do, but he can probably help a lot. The OSCAR group has among its members people who deal with military construction as a part of their jobs and they are available to advise. It would seem that clubs made up of employees of some of the large companies doing space work could band together to produce something. The TRW group did just that and it is a terrible shame the launch went sour. Should you be in a position to contribute in any way (even with an OSCAR membership at $5 I think), write Project Oscar, Inc. Foothill College, Los Altos Hills, Calif. 94022. (by K7AAD)

CENTRAL STATES VHF CONFERENCE

The Central States V.H.F. Conference will have its annual meeting August 19th and 20th at Western Hills Lodge, near Wagoner, Okla. For information or reservations contact Sam Whitley, W5WAX, 409 North "O" street, Muskogee, Okla. 74401.

PROBLEMS WITH PARKS CONVERTERS

It has recently come to our attention how noise figure can be clobbered by a ham changing connectors on the input. If you deform the coil, you've had it. Best rule is, DON'T.

OPEN BANDS

by Marilyn Wiseman, K8ALO

Aurora, aurora, aurora. This is the main topic for the month of May. Best aurora reports since I have been writing the column. Plenty of states worked or heard. Meteor scatter reports also up. Thanks to all who sent in reports. See you next issue. Looking forward to your report. My address: Box 103, Petersburg, Ohio 44454.

50 MHz Aurora:

May 25	WA7BTG (Wash.) wrkd W7ZFG, K7RWT (Ore.) K6RNQ, K6YIL (Cal.) K7ICW (Nev.) wrkd K7PLR (Ariz.), W7CNK (Wash.), K7VGB (Utah), WA5RYX (N.Mex.), WA6EXE, WA6SQI, WA6AKM, WB6GEN (Calif.) hrd K7TLX, W7DNV, KØJKY/7 plus Calif. stations.

144 MHz:

April 2-23	K7ICW (Nev.) wrkd W6NLZ, W6DQJ, W6YVO, K6MBY, W6DEJ, and WA6TBY. Al says a Nev.-San Diego hrd on 2 meter for the first time. Heard both ways (a difficult path).
April 13	K2HLA (N.Y.) wrkd K8UGA (Ohio) 500 mi.
May 9-30	K7ICW (Nev.) wrkd W6DQJ, W6NLZ, W6YVO, W6DNG (Calif.), K7RKH/7 (Utah).

144 MHz Meteor Scatter:

April 19	K2HLA (N.Y.) hrd W5GVE/4 (Ala.) ping, ect. no QSO.
April 21	K1ABR (R.I.) wrkd W9YYH (Ill.)
April 22	K1ABR (R.I.) wrkd K4QIF (N.C.).
April 23	K2HLA (N.Y.) hrd W5GVE/4. K1ABR (R.I.) wrkd W8TIU (Mich.). Dick says no new states for him but first R.I. for Mich. station.
May 1-6	Aquarids showers: K2HLA(N.Y.) wrkd W5GVE/4 (Ala.) 1000 mi. This was new state for both. Hrd W5UKQ (La.), WØNXF (Neb.), KØMQS (Ia.). Dick says not bad for minor shower. K1ABR (R.I.) had M/S skeds with KØMQS (Ia.), W5GVE/4 (Ala.), WØNXF (Neb.), no QSO developed. Dick hrd the Ia. and Ala. stations. Dick wrkd Rusty K4QIF (N.C.) twice during the period Jan. thru May. He will try tropo skeds with Rusty after Rusty gets set up in new QTH. After June 5, K4QIF will be in Portsmouth, Va. (450 mi. path). Dick also passes along this info. K1UGO will be in Maine for Aug. and Sept. only. He will M/S sked. Dick also reports he will continue daily M/S skeds with W4AWS (Fla.) 0710-0745 EDT. R.I. freq. 144.022.5. Fla. freq. 144.105 MHz. Dick says W4NUS (N.C.) has been known to wrk M/S, but hasn't had much news on him lately. K1HTV (Conn.) wrkd W5GVE/4 (Ala.) for st. #27. Hrd KØMQS (Ia.), K4IXC (Fla.), K4QIF (N.C.).
May 21	WØNXF (Neb.) hrd K1HTV (Conn.), W5GVE/4 (Ala.), W8AEC (W.VA), on M/S sked.
May 28	W9YYF (Ill.) wrkd K4IXC (Fla.). Jack says this sked kept every Sat.

and Sun. mornings. He says John comes thru every time but not all QSO's completed.

Attention Meteor Scatter Fans:

Read "Meteors, Comets and Meteorites", book by Gerald S. Hawkins (McGraw Hill Book Co., $2.50). Bob Berk WØNXF says this book is so darned good on meteor scatter info that he wanted everyone to know about it and thought many would be delighted with it.

144 MHz Aurora:

April 23 — K2HLA (N.Y.) wrkd K9UIF (Ind.) 800 mi. Dick says aurora lasted about 30 mins. but was very intense. Sigs. S 9 plus.

May 2-3 — Dick K2HLA (N.Y.) reports very weak aurora both nights, lasting many hours. No QSO's attempted. Dick says 144 MHz conditions during the winter months on East Coast very poor. Band started picking up about the middle of April.

May 3 — WØNXF (Neb.) wrkd WØLER (Minn.) 5-9 both ways. Bob says good opening but no other sig. hrd. He says WWV was sending U 5 at that time.

May 25 — W9YYF (Ill.) wrkd W3GKP (Md.), K1HTV (Conn.), K4EJQ (Tenn.), WØEYE (Colo.), W4HJZ, K4QIF/4, K4YYJ (N.C.), WØEKZ, WØALS (Kans.), W2AZL, WA2FGK (N.J.), K2GUG (N.Y.), W5WAX, W5HFV, W5ORH (Okla.), K3PGP (Pa.). W7FS (Wash.) wrkd W7MKW (Idaho), W7RQT (Utah), hrd W7UFB (Wyo.). Tnx to Kim WA7BTG for this info. WA7BTG (Wash.) wrkd K7ZFG (Ore.) K8AXU (Ohio) wrkd K1HTV (Conn.), W4HJZ (N.C.), K2MHG (N.J.), K5WXZ (Tex.), W5ORH (Okla.). K7ICW (Nev.) wrkd W7DTS (Idaho) for first Idaho-Nev. 144 MHz contact, K7ZIR (Ore.). K1HTV (Conn.) wrkd W9YYF (Ill.), K8AXU, W8DGF/8, W8QOH, W8NUB, W8FEH (Ohio), W4HJZ, K4QIF (N.C.), W3GKP, W3HB (Md.), W4FJ, W4OEA (Va.), VE3ASO (Ont.), W9BRN (Ind.), VE2HW, VE2JO (Que.) K3PGP (Pa.), hrd K4YYJ (N.C.), W4KVI (Va.), W8PIH (Ohio), W8AEC (W.Va.), K3CFA, K3IWK (W.Pa.) W3BDP (Del.), VE3EZC (Ont.).

May 26 — K8AXU (Ohio) wrkd WØFIL (Kans.), W5GVE/4 (Ala.). Al says the band was open from 3:30 p.m. to 4:00 a.m. EDT when he went to bed. Al hrd 24 states. WØNXF (Neb.) wrkd WA9DOT (Wis.), KØMQS (Iowa), W8TIU (Mich.), W5WXZ (Tex.), WA5MFZ (N.Mex.), WØEYE WØIC (Colo.), WØYMO, WØFIL (Kan.), W9PBP, W9BOZ, W9JGQ (Ill.), W5GUG (Ark.), W5ORH (Okla.) hrd W8KAY (Ohio), W8PT (Mich.) Bob says a wonderful aurora from 0000 to 0330 CDT. Bob now has 34 states.

May 28 — K1HTV (Conn.) wrkd VE3FKX (Ont.), K4SUM (Va.), W9YYF, W9PBP, W9BOZ (Ill.), W8HSZ (Mich.), W8QOB (W.Va.), WA9DOT (Wisc.). K8AXU (Ohio) wrkd KØMQS (Ia.), W1AZK (N.H.), WA9DOT (Wis.). Al says the band was open until he retired at 2:00 a.m. hearing 14 states. states. W9YYF (Ill.) wrkd W1MEH (Conn.), K1HTV, K1ABR (R.I.), K2LGJ, W2SFK, WA2CJK, K2DNR, K2TXB, K2GUG (N.Y.), W2AZL, W2BLV (N.J.), W4HJQ (Ky.), K4SUM (Va.), WØNXF, K7UMC/Ø (Neb.) KØIJN (Minn.). WØNXF (Neb.) wrkd WA8PIE, K8TIU (Mich.), W9YYF, W9UNN, W9ZIH, W9BOZ, W9MAL (Ill.), W9BRN, K9UIF (Ind.), W4HJQ (Ky.), KØIJN, WØLCN, WØRLI (Minn.) KØGEY, KØMQS (Ia.),

K8UQG (Ohio). Bob says WWV was sending Geo MMMMM also U 3.

May 29 WØNXF (Neb.) wrkd W8PT, W8HSZ (Mich.). Bob hrd several Mich. Ill., and Ia. stations wrking far East Coast, with no W1's or W2's getting through to Neb. K1HTV (Conn.) hrd KØGEY (Ia.).

May 30 K1HTV (Conn.) wrkd W3BDP (Md.), K8DEO, W8KAY (Ohio), K3CFA (Pa.), VE1ER (New Brunswick), W9BRN (Ind.). Rich says May was an interesting month as far as 2 meter propagation is concerned. W9YYF (Ill.) wrkd K2YCO, K2GUG, K7UMC/Ø (Neb.) and many others within 300-400 mi. distance. K8AXU (Ohio) says the band was in and out from 9:00 p.m. till midnight EDT hearing 8 states. Al says he listened on 432 MHz band all 3 days not hearing any sig.

May 31 WØNXF (Neb.) wrkd W9UNN, K9SGD (Ill.), W8KAY (Ohio).

220 MHz Aurora:

May 25 K8AXU (Ohio) hrd W8PT (Mich.). Al says he wished there was more activity on 220 so the band could be used for good openings like this.

432 MHz:

May 11-28 K7ICW hrd and wrkd W6DQJ. Also hrd K7RHH (Nev.).

May 30 K7ICW wrkd K7RKH/7 (Utah) for the 1st Utah-Nev. 432 MHz QSO

Skeds Wanted:

K2HLA Dick Wilborg, RFD #1, Cutchogue, L.I., New York 11935 wants skeds with Ga., Miss., Ark., La. and Kans. Also looking for long haul skeds for August perseids meteor showers up to 1000 mi.

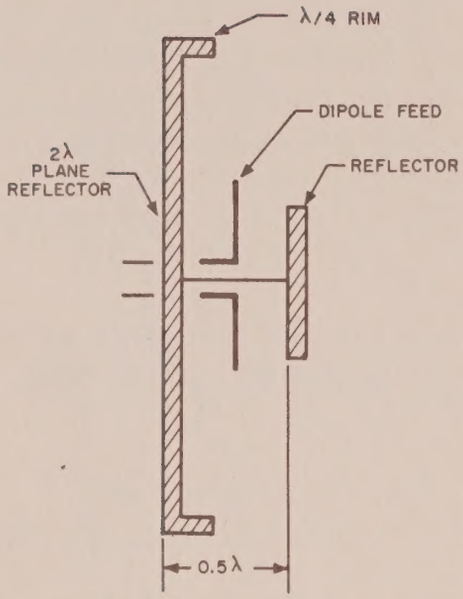
W9YYF Jack Spencer, 205 Sherry Lane, Joliet, Ill. 60433, wants tropo or meteor scatter skeds on 144 MHz. Jack uses 4CX250 500 watts 8/8 J Beam.

WØNXF Bob Berk, 5218 Prescott, Lincoln, Neb.68506, wants 144 MHz meteor scatter skeds with Idaho, Wyo., Utah, Ark., Miss., and others, freq. 144.022 MHz.

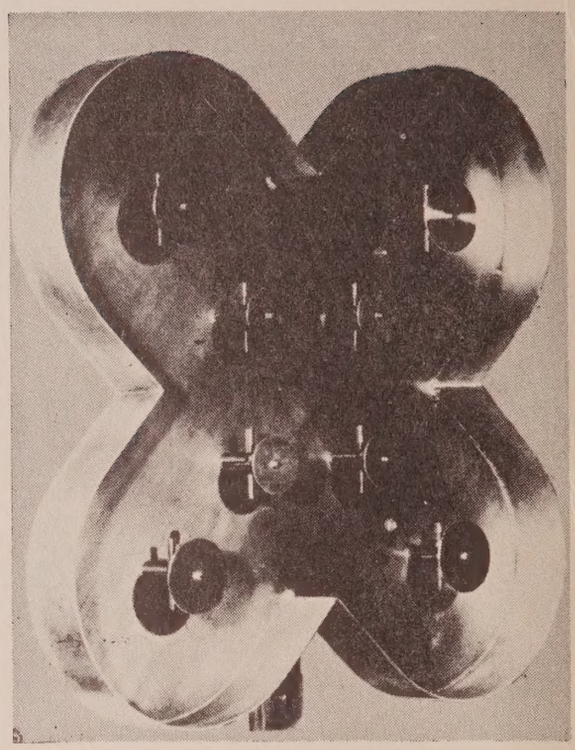
K1HTV Richard Zwirko, 19 Lancer Dr., Thompsonville, Conn. 06082, phone no. 203-745-0428, looking for meteor scatter skeds with Miss., Ark., Kan., N.D. and N.E. Texas. Rich also says he's available for M/S sked for anyone needing Conn. Rig: 4CX250 F 500 watts. Ant. 11/11, rcvr. nuvistor converter into HQ170, M/S freq. 144.103 MHz. Also VXO 144.001 to 144.190. Rich also reports the East Coast VHF net meets on Sun. nights at 2100 EDT on 3815 Kc.

K4QIF "Rusty" Holshouser, 3800 Yaupon St., Chesapeake, Va. 23706 wants 2 meter meteor scatter skeds everywhere as he just moved.

Ed. note: When you want a meteor scatter listing for the first time, please include a description of your equipment. The listing is intended for hams with good equip. A person answering your request has a right to know if you're properly set up. No one wants to get up at 3 a.m. & pound brass trying to work an 829B into an 8 ft yagi.



1. Short-backfire antenna uses two reflectors to build up energy level



2. Cloverleaf of short-backfire antennas form monopulse array

Published by Parks Electronics Lab.
419 S.W. First
Beaverton, Ore. 97005

J.J. O'BRIEN 6-69-1 (4)
6606 FIFTH STREET
RIO LINDA, CALIF. 95673

Return Requested